cc: Leslie
TASK: 4853

URS

May 21, 2012

Paul B. Baker
Mineral Program Manager
Utah Division of Oil Gas and Mining
PO Box 145801
Salt Lake City, UT 84114-5801

Subject: Response to Second Review of Notice of Intention to Commence Large Mining Operations, Kennecott Utah Copper, LLC, Bonneville Borrow Mine, M/035/0046, Salt Lake County, Utah

Dear Mr. Baker:

Attached you will find replacement pages of the Notice of Intention to Commence Large Mining Operations (NOI) for your file that address your comments from April 30, 2010, as well as a separate, clean copy of the NOI. Upon your review, please forward a stamped "Approved" copy of the NOI to Glenn Eurick.

If you have any questions, please contact me at 801-904-4084 or Glenn Eurick at 801-541-3577. Thank you for your attendance to this matter.

Sincerely,

URS Corporation

Amber Fortner
Project Manager

Enclosure
- Response to comments table
- Replacement Pages
- NOI

cc: Glenn Eurick, KUC

RECEIVED
MAY 21 2012
DIV. OF OIL, GAS & MINING

URS Corporation
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SECOND REVIEW OF NOTICEOF INTENTION
TO COMMENCE LARGE MINING OPERATIONS
Kennecott Utah Copper, LLC
Bonneville Borrow
M/035/0046
April 30, 2012

General Comments:

Comment #	Sheet/Page/ Map/Table #	Comments	Initials	Review Action	Response to Comments
1	General	Submittal should be formatted to easily incorporate additional revisions and amendments.	lah		Concur
2	General	Additional comments from the Division can be generated in the future based on submittals received in the future, every attempt should be made by the Operator to submit a complete NOI the first time around.	lah		Concur

R647-4-105 - Maps, Drawings & Photographs

105.2 - Surface facilities map

Comment #	Sheet/Page Map/Table #	Comments	Initials	Review Action	Response to Comments
3	Figure 5B or 5C	Add a drawing of a stone check dam to the figure.	lah		A stone check damn has been added to Fig 5C.

105.3 - Drawings or Cross Sections (slopes, roads, pads, etc.)

Comment #	Sheet/Page Map/Table #	Comments	Initials	Review Action	Response to Comments
4	Figures 4A, 4B, 4C	A flow direction arrow is shown outside of the mine limits. The arrow is technically correct, but the area is not part of the mine disturbance. Please remove the blue arrow that doesn't apply. Please also review the figures in the SWPPP.	lah		The blue flow direction arrow that was shown outside of the mine limits has been removed from Figures 4A, 4B, 4C and Figure 2 of the SWPPP.

R647-4-106 - Operation Plan

106.5 - Existing soil types, location, amount

Comment #	Sheet/Page Map/Table #	Comments	Initials	Review Action	Response to Comments
5	Back of pages 15 & 16	OGM wrote on Feb 1, 2012 "To accommodate the large Table 3, the back of page 15 and 16 is blank." It would be helpful if these pages were marked, "This page is intentionally left blank." As printed, the current permit is 1-sided pages.	lah		The permit is printed 1-sided and intentionally blank pages have been removed. Table of Contents have been updated.

R647-4-109 - Impact Assessment

109.4 - Slope stability, erosion control, air quality, safety

Comment #	Sheet/Page Map/Table #	Comments	Initials	Review Action	Response to Comments
6	Appendix	Submit Air Quality Approval Order when received and then rewrite page 29.	lah		Concur

R647-4-113 – Surety

Comment #	Sheet/Page Map/Table #	Comments	Initials	Review Action	Response to Comments
7	Page 41	Add number of acres after the words "Reclamation Cost Estimate".	lah		The number of acres has been added after "Reclamation Cost Estimate".
8	Appendix F page 1 of 1	Add number of acres after the words "Posted Bond".	lah		The number of acres has been added after "Posted Bond".

Kennecott Utah Copper LLC – Bonneville Borrow Area - NOI

Table of Contents

Figures

R647-4. Large Mining Operations

R647-4-101. Filing Requirements and Review Procedures

This Notice of Intention (NOI) is submitted to the Utah Division of Oil, Gas and Mining (DOGM) in compliance with part R647-4 of the Utah Minerals Reclamation program by Kennecott Utah Copper.

The proposed quarrying operation is located in unincorporated Salt Lake County, Utah, west of Magna Township, on a 300-acre parcel owned by Kennecott Utah Copper LLC (KUC). Portions of the proposed quarry are located in Section 31 of T1S, R2W and Sections 25 and 36 of T1S, R3W, SLBM.

R647-4-102. Duration of the Notice of Intention

Kennecott understands that, when approved, this NOI, including any subsequently approved amendment or revision, remains in effect for the life of the mine, but that DOGM may review the permit and require updated information and modifications when necessary. Kennecott estimates that the borrow operations will continue until approximately 2028.

R647-4-103. Notice of Intention to begin Large Mining Operations

Kennecott Utah Copper's NOI addresses the requirements of the rules listed in this section as follows:

104. Operator(s), Surface and Mineral Owner(s)
105. Maps, Drawings, and Photographs
106. Operation Plan
108. Hole Plugging Requirements
109. Impact Assessment
110. Reclamation Plan
112. Variance
113. Surety

R647-4-104. Operator, Surface and Mineral Owners

1. Mine Name: Bonneville Borrow Area
2. Operator:
Kennecott Utah Copper LLC
Kelly D. Sanders
4700 Daybreak Parkway
South Jordan, UT 84095
Phone: 801-204-2000
Fax: 801-204-2885
Email: sander@kennecott.com

Type of Business: Limited Liability Company
Utah Business Entity No.: 1036481-0160
Local Business License No.: NA
Issued by: Salt Lake County

Registered Utah Agent
Chris Kaiser
4700 Daybreak Parkway
South Jordan, UT 84095
Phone: 801-204-2128
Fax:
Email: Chris.Kaiser@riotinto.com

3. Permanent Address
Kennecott Utah Copper LLC
4700 Daybreak Parkway
South Jordan, UT 84095
Phone: 810-204-2000
Fax:
Email:

4. Contact Person for Permitting, Surety, Notices:
Glenn Eurick
4700 Daybreak Parkway
South Jordan, UT 84095
Phone: 801-204-2113
Fax: 801-204-2888
Email: Glenn.Eurick@riotinto.com

5. Location of Operation: Portions of Section 31, T1S, R2W, SLBM and Portions of Sections 25 and 36, T1S, R3W, SLBM

6. Ownership of Land Surface: Kennecott Utah Copper LLC
   4700 Daybreak Parkway
   South Jordan, UT 84095
   Phone: 801-204-2000
   Fax:
   Email:

7. Owners of Record of Mineral to be Mined:
   Kennecott Utah Copper LLC
   4700 Daybreak Parkway
   South Jordan, UT 84095
   Phone: 801-204-2000
   Fax:
   Email:

8. BLM Lease of Project File Numbers: None

9. Adjacent Land Owners: Kennecott

10. Have the land, mineral, and adjacent owners been notified in writing?
    Not applicable

11. Does Permittee/Operator have a legal right to enter and conduct mining operations on the land covered by this notice?
    Yes, Kennecott owns the surface and minerals in the proposed borrow area, and the parcel is accessed through the Kennecott entrance on 9180 West off State Route-201 on the west side of Magna, Utah.

R647-4-105. Maps, Drawings, and Photographs

Maps, drawings, and photographs are provided as requested.

105.1. Base Maps: Figures 1 and 2

Figure 1: Base and Mine Location Map shows the mine area and surroundings and is printed at a scale of 1"=1,000'. It shows streams, springs, water bodies, roads, buildings, topography and utilities as required in (b). There are no known underground workings on the site.

Figure 2: Land Ownership Map is printed at a scale of 1"=1,000' and shows the property boundaries, surface ownership of the mine and adjacent lands, and access routes.

105.2. Surface Facilities Maps: Figures 3 and 4

Figure 3: Existing Surface Facilities and Contours Map is printed at a scale 1"=1,000' and shows existing surface facilities, roads and washes that pass through or near the lands to be affected.

Figure 4a: Mine Plan Map, Interim Excavation Phase 1 Borrow is printed at a scale of 1"=700'

Figure 4b: Mine Plan Map, End Phase 1 Borrow is printed at a scale of 1"=700'

Figure 4c: Mine Plan Map, End Phase 2 Borrow is printed at a scale of 1"=700'

Figure 4d: Crusher and Stockpile Detail is a sample crusher layout and stockpile map.

Figure 4e: Crushing and Screening Plant, Ballast and Sub-ballast Production is a flow diagram.

Figure 4f: Crushing and Screening Plant, Filter Material Production is a flow diagram.

Figure 4g: Crushing and Screening Plant, Roadbase Material Production is a flow diagram.

105.3. Reclamation Treatments: Figures 5

Figure 5: Reclamation Treatments map is printed at a scale 1"=700' and shows details about reclamation treatment areas, including what disturbance, such as highwall, topsoil stockpiles and roads, will be reclaimed. A border outlining the extent of the area to be reclaimed vs. the affected area is shown. Salvaged overburden will be used to slope the highwalls during the reclamation process so that no quarry faces will be left exposed when reclamation is complete.

Figure 5a: Interim Reclamation Plan is printed at a scale 1"=700' and shows details about interim reclamation between Phase 1 and Phase 2.

Figure 5b and 5c: Erosion Control Best Management Practices depicts many of the best management practices (BMP) to be employed as part of a comprehensive erosion control effort within the limits of the mine property.

105.4. Additional Maps:

Figure 6: shows cross-sections of the reclaimed pit.

Figure 6a: shows cross-sections of the reclaimed pit.

Figure 7: is a Utah Division of Water Rights map printed at a scale of 1"=1,000' showing area water rights.

Figure 7a: is a Water Shed map printed at a scale of 1"=2,000' showing the principle watershed areas.

Figure 8: is a soils map printed at a scale of 1"=1,000' showing existing soil types.

Figure 9: is a Geology map printed at a scale of 1"=1,000' showing the underlying geology of the mine.

105.5. Photographs of the existing vegetation and topography are included in Appendix A.

R647-4-106: Operation Plan

106.1. Mineral to be Mined

The Bonneville Borrow Area will produce pit run and crushed and/or screened aggregate for construction. This will include material obtained from blasting and ripping operations in bedrock-type quartzite deposits.

106.2. Type of Operation to be conducted

The Bonneville Borrow Area will be used for providing earth construction materials for various Kennecott projects, primarily for construction of engineered structures adjacent to the existing tailings impoundment, and for the Tailings Expansion Project (TEP). The borrow area is further identified into three sub-areas: quartzite borrow area, alluvial borrow areas, and railroad embankment borrow area. Kennecott Utah Copper will primarily extract rock for the construction needs of the railroad relocation, stability berms, drainage blanket, road base materials, bridging, riprap, structural fill and other miscellaneous requirements for the TEP. The material will be mined from three zones or areas within the project footprint, i.e., the quartzite borrow area, and the alluvial borrow area, and the railroad embankment borrow area. Mining will take place in two phases, each of which will

extract material from the quartzite and alluvial borrow areas, while the railroad embankment borrow area will only be active in the second phase.

The total amount of material to be produced from the quartzite borrow area during Phase 1 is 1.57 million cubic yards, and includes about 1.3 million cubic yards for the drainage blanket, about 0.15 million cubic yards for road base, and about 0.08 million cubic yards for railroad ballast and sub-ballast materials.

During Phase 1, about 2.15 million cubic yards of material will be produced from the alluvial borrow area. The majority, 1.66 million cubic yards, will be used as bridging material within the tailings construction area as foundation material primarily for haulage routes. About 0.48 million cubic yards will be required as embankment fill for the railroad relocation and 7200 West road modification. Riprap will be produced from the alluvial borrow area through sorting during excavation.

Only Phase 1 construction materials will be excavated during Phase 1, however the quarry areas are designed to accommodate Phase 2 quantities, allow for interim reclamation of the quarry areas as well as providing access for Phase 2 development. As part of Phase 2 about 3.6 million cubic yards of random fill will come from the existing railroad embankment and the alluvial terrace for construction of engineered structures. Some of the alluvium from the terrace will be processed to produce about 0.2 million cubic yards of rip rap. The location of the mine is shown in **Figure 1**.

Mining Operation

Kennecott will remove the rock from the active mine area by drilling, blasting and/or dozer methods. The equipment used for mining includes, but is not limited to: haul trucks, loaders, scrapers, dozers, drill rig and water trucks. The Bonneville Borrow Area consists of three areas. These include the quartzite borrow, the alluvial borrow, and the existing railroad embankment borrow area. A portable crusher and screen plant will operate next to the quartzite and alluvial borrow areas. The Bonneville Borrow Area will be developed in two phases (**Figure 4a-4e**) with an interim closure between Phase 1 and Phase 2.

The approximate location and layout of these parts of the Bonneville Borrow Area are shown on **Figure 4a**. The quartzite borrow is located within a bedrock ridge at the south end of the site. The alluvial borrow area will extend the existing borrow site, located at the west side of the site, into the materials filling the bottom of the valley further west and north. An existing railroad embankment fill located at the western margin of the alluvial borrow site will also be removed to provide random fill during Phase 2 construction.

The quartzite material will be removed by drilling, blasting and ripping. Mining will remove approximately 50 vertical feet of previously mined material from the top of the eastern side of the rail cut. At that depth, the dolomite appears to be resistant to ripping and will therefore be left in place to act as a visual barrier from Magna. Mining will continue south of the dolomite contact in the quartzite. The south face on the east side of the rail cut will be mined at a 1:1 (H:V) slope to maximize the quartzite recovery. The remaining talus material on the northern most face east of the rail cut will be removed by backhoe and or dozing the material down the face to the west.

As the east side of the existing rail cut is being mined, the western side of the rail cut will be developed. The north facing slope will be mined at a 2.5:1 (H:V) slope and material will be hauled to the crushing plant. Mining on the western side of the cut will continue in conjunction with the eastern side. Phase 1 mining will end at elevation 5070 feet. Phase 2 mining will lower the floor to the 5020 feet elevation (the original rail cut floor).

The alluvial material will be removed by excavation and loading. Mining will initially proceed directly south at approximate elevation 4800 feet from an existing alluvial borrow. As mining reaches the final limits of the designed excavation the slopes will be cut at 2.5:1 (H:V) slopes. The floor will be sloped to the southwest as a storm water control feature. The alluvium shallows to the south, therefore mining in this area will be limited to approximately 250 feet in width and a maximum depth of 50 feet. Mining will continue to the west and north, in 25 foot increments from the surface, leaving a road along the south edge for access to the railroad embankment, which will be removed during Phase 2. Groundwater is approximately 220 feet below the alluvial borrow area, and quarry operations will virtually have no effect on the groundwater flows in the area. Groundwater is further discussed in Section 106.8 below.

The railroad embankment material will be removed by ripping and loading during Phase 2. The embankment borrow area design consists of removing materials forming the embankment and returning the area to as near to pre-embankment topography as possible. The gently sloping topography upstream and downstream of the embankment would be uninterrupted after excavation and removal of the embankment. A road constructed along the south edge of the alluvial borrow area during Phase 1 excavation will be used to access the toe of the railroad embankment. An all cut road will be constructed from south to north through the embankment materials to allow excavation by benching.

The portable crusher and screen plant is located within the alluvial borrow areas, immediately below the quartzite borrow in order to minimize the total disturbance and the haulage distance to the plant from the quartzite borrow. The location of the plant takes advantage of the existing terrain and is sited to reduce the plant's visibility from the town of Magna. The initial material requirements during construction can be

developed from the alluvium borrow, allowing early borrow works to develop the site for the crushing/screening plant. The haulage from the borrow area to the tailings construction area will utilize existing paved roads where practical in order to reduce dust emissions. Haul truck traffic crossing the tailings delivery pipes will be limited to a single engineered crossing.

Crushing Operation

Once the rock is removed from the working face (see **Figure 4a**), the material is brought to a crushing and screening plant located in the alluvial borrow area. Boulders will be blasted in place, fines from crushing will be disposed of off the borrow site into the adjacent tailings pipeline. Refer to **Figure 4f** for a conceptual crushing and screening plant layout. The crushing and screening plant is designed for a peak production rate of 700 tph of feed material. The average production feed rate will be roughly 525 tph (or 75% of peak rate). The crusher plant includes a primary/secondary crushing section, a tertiary crushing section, a quaternary crushing section, and a sand processing section. See **Figure 4e**, (for the flow diagram) for ballast and sub-ballast production, **Figure 4f** for filter material, and **Figure 4g** for Roadbed production diagram.

The plant design gives the flexibility to produce gravel and sand products simultaneously while allowing for adjustments in proportions and product specifications with splitter bins and screen deck opening adjustments. Sand products can also be adjusted with the controls of the sand classifier.

The finished product comes out of the crushing plant and is conveyed into the aggregate storage piles, where they are stored until needed for use. When the material is needed for the construction of the engineered structures and/or of the TEP the respective aggregate size will be loaded into 40-T articulated haul trucks and transferred to the construction location. All conveyors are equipped with spray bars that spray water at drop points. Water trucks will wet the haul roads between the stockpile area and the construction areas to minimize dust created from the loaders and the trucks. Dust control stormwater is further discussed in Section 109.4 and the Stormwater Pollution Prevention Plan (SWPPP), **Appendix E**, below.

Blasting Practices

Blasting will be used in the mining process at the Bonneville Borrow Area. Blasting will be conducted by KUC only during daylight hours. It is assumed the 25% of the quartzite material will need to be drilled and blasted. No drilling and blasting is anticipated in the alluvium borrow area or the railroad embankment.

Air type crawler type drills with 4 inch drill bits will be used for drilling. It is assumed the average monthly quartzite to be drilled is 21,000 cubic yards (cy) or 250,000 cy

annually. Approximately 250 holes per month will be drilled for the required quartzite to be blasted. Typical blasting patterns are assumed to be10 feet by 10 feet square patterns, with a bench height of 20 feet. Each pattern produces approximately 89 cy of quartzite.

Typical blasting rounds are assumed to consist of packaged ANFO explosives and electronic blast-initiation system, however not exclusive, other blasting approaches will be used as needed.

Blasting protocols will follow Kennecott's and Rio Tinto safety standards, and will consist of but not limited to the following; before blasting occurs, a pre-blast warning siren will be used to alert and clear all personnel from the blasting zone. At that time all personnel and equipment will be removed from the quarry area. Access to the quarry will be blocked off by a person with radio communications to restrict access to the area. The siren is then sounded again with a countdown to detonation. Blast is then detonated. No one enters the blasting zone until the blaster has given the all clear. All blasting will be done in accordance with MSHA regulations.

Concurrent Reclamation

No reclamation will take place during Phase 1 or Phase 2, however there will be an interim reclamation done between phases. Increased production will force utilization of all additional mine-out acres for staging, sorting, or processing. Final reclamation will take place after Phase 2. Reclamation is further discussed in Section 110 below.

106.3. Estimated Acreage

Approximately 134 acres will be disturbed over the life of the Borrow Area. This figure includes all access road, storage piles, processing areas, mine areas and affected areas. Kennecott will confine its mining activities to approximately 118 acres during Phase 1.

Table 1: Acres to be affected during Phase 1 and Phase 2

Area	Approximate Total Affected Acreage	Disturbance Description/Notes	Growth Medium Salvaged (K BCY)
Phase 1			
Existing Mine Disturbance	NA[1]	Pre-existing disturbance	NA[1]
Upper Alluvial Borrow	37	Material on the valley floor, elevation 5020-4880 MSL	362
Lower Alluvial Borrow	37	Material on the valley floor, elevation 4870-4790 MSL	362
Quartzite Borrow	29	Material on south end	14
Ramp from Quartzite Borrow	6	Material on south end	0
North Face East of Rail Cut	0	Material on south end	11
Haul Road	9		15
Phase 1 Subtotal	118		764
Phase 2			
Alluvial Borrow	14	Material on the valley floor, elevation 4870-4790 MSL	139
Quartzite Borrow	1	Material on south end	0
Phase 2 Subtotal	15		139
Total Disturbance – Life of Mine	133		903

[1] existing borrow area will be subject to full surety requirements
K BCY – 1,000 Bank Cubic Yards
MSL - Mean Sea Level

106.4. Nature of material, including waste rock/overburden, and estimated cubic yards

Borrow Material
The current plan is to produce almost 1.6 million cubic yards (MCY) from the quartzite borrow area for Phase 1 and about 0.8 MCY for Phase 2. The alluvial borrow area will produce about 2.2 MCY of materials for Phase 1 and about 2.9 MCY of materials for

Phase 2. The railroad embankment borrow area is expected to yield about 1.0 MCY of random fill materials for Phase 2 (see **Table 2** for Summary of borrow material).

Table 2: Summary of Borrow Material

Borrow Area	Phase 1		Phase 2		Total Borrow (CY)
	Material Description	Volume (CY)	Material Description	Volume (CY)	
Quartzite Borrow Area	Fine Filter	774,000	Blanket Drain	800,000	
	Drain Rock	274,000			
	Coarse Filter	251,000			
	Railroad Ballast	50,000			
	Railroad Sub-ballast	48,000			
	Road Base	170,000			
Total	-	1,567,000	-	800,000	2,367,000
Alluvial Borrow Area[1]	Bridging Material	1,664,000	Rip Rap Bedding	100,000	
	Railroad and Highway Embankment Fill	478,000	Rip Rap	200,000	
	Rip Rap 6-inch	245	Engineered Structures	2,600,000	
	Rip Rap 12-inch	39	-	-	
	Structural Fill	11,600	-	-	
Total	-	2,154,000	-	2,900,000	5,054,000
Railroad Embankment Borrow Area	-	-	Engineered Structures (random fill)	1,000,000	
Total	-	-	-	1,000,000	1,000,000
Total Borrow	-	3,721,000	-	4,700,000	8,421,000

[1] South engineered structure included in Phase 1 for purposes of material quantity
CY – Cubic Yards

Historic Mining and Disturbance Area Summary
This property has been previously disturbed multiple times within the last 50 years. Large portions of the property have been bulldozed and filled with heavy sand and rock fill. A railway associated with Kennecott operations had been constructed along the western edge of the permit boundary, disturbing a large swath in a general north and south direction.

106.5. Soils

Most of the soils on the north side of the quartzite borrow area that is located along the west side of the abandoned railroad consist of silty fine grained sands from the slopes. A surficial layer of sandy clayey organic soils, estimated to range from less than 5 to 10 feet thick, will be stripped from the alluvial borrow area and stockpiled for reclamation of the borrow area or tailings impoundment. The soils cover the surface of the terrace and include some recent flood and debris flow deposits. The volume required to be stripped, stockpiled, and used for reclamation is estimated to range from 500,000 to 1,000,000 CY, for both Phase 1 and Phase 2 construction.

Soil map units are shown in **Figure 8**, Soils. Samples of the top 12 inches were collected from five soil pits throughout the mine area. Two soil samples were collected at each location. The first sample was collected from soil located zero to six inches below the ground surface and the second sample was collected from soil located six to 12 inches below the ground surface. These samples were taken to characterize the soils in preparation for future soil salvage. The sample locations are shown on **Figure 3**, Soil Survey Addendum to the Ecological Baseline Report, **Appendix C**. Analytical sampling results are shown in the **Table 3** below.

Results of laboratory testing suggest a range of potential borrow materials exist. In general, the alluvial deposits contain relatively high fines content (up to 68.6%) and clasts that have relatively high carbonate content, which can react with acidic water and cause precipitate, and clogging of drain materials (calcium carbonate, calcite equivalent content up to 55%). The beach and lake spit sands and gravels contain fewer fines (range of 1.8% to 16.9%); however, they also contain sand, gravel, and cobble sized clasts (see photo below) with relatively high carbonate content (range of 34% to 44%). Carbonate content testing was also performed on fines produced from the durability testing, in order to estimate carbonate content within the gravel fraction of the alluvium, which was found to be similar to the results from the fine fraction. Oxidation tests were performed to help characterize potential for the alluvial materials to produce acidic conditions and potentially react with the process water.

Table 3: Analytical Results of Spring, 2011 Soil Samples, Top Twelve Inches of Soil

Analyte (Units)	Reporting Limit	Analytical Result Area 1 @ 0-6"	Analytical Result Area 1 @ 6-12"	Analytical Result Area 2 @ 0-6"	Analytical Result Area 2 @ 6-12"	Analytical Result Area 3 @ 0-6"	Analytical Result Area 3 @ 6-12"	Analytical Result Area 4 @ 0-6"	Analytical Result Area 4 @ 6-12"	Analytical Result Area 5 @ 0-6"	Analytical Result Area 5 @ 6-12"
Total Potassium (mg/kg)	200	1,660	960	1,300	520	3,250	3,620	3,440	3,330	3,000	3,620
Uniform Soil Classification	not applicable	loam	sandy clay loam	sandy loam	sandy loam	clay loam	loam	loam	loam	loam	clay loam
Cation Exchange Capacity (meq/100g-dry)	0.2	7.1	4.1	2.6	1.2	12	9.7	9.2	9.4	9	10
Conductivity (mmhos/cm)	0.01	0.485	0.479	0.585	0.257	0.14	0.115	0.153	0.128	0.38	0.378
pH @ 25 °C	0.1	7.5	8	8.1	9.1	6.4	6	5.8	6.5	7.8	7.6
Extractable Phosphorus (mg/kg)	5	8	3	5	2	15	37	28	16	21	22
Sodium Absorption Ratio (SAR)	0.15	0.39	0.4	0.23	0.3	0.38	0.54	0.51	0.43	0.17	0.17
Total Nitrogen (as N) (%)	0.005	0.08	0.0507	0.0216	0.0113	0.117	0.0717	0.075	0.0728	0.049	0.0697
Sulfur, Total (%)	0.1	0.02	<0.1	0.14	0.03	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acid Generation Potential	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Acid Neutralization Potential	5	19	134	405	446	5	5	7	8	41	33
Acid Base Account	5	19	134	401	446	5	5	7	8	41	33

°C - degrees Celsius
g - gram
kg - kilogram
meq - milliequivalent
mg - milligram
mmhos - millimhos
N - nitrogen
% - percent
< - the amount detected was lower than the reporting limit (practical quantitation limit).

The soil in all test pits appeared relatively homogenous from the ground surface to 12 inches deep, therefore not revealing soil horizons. Samples area 1, 2 and 5 were taken from area mapped as Stony terrace escarpments. Samples area 3 and 4 were taken from Kearns silt loam, 3 to 6 percent slopes. For comparison purposes the typical profile of the soils is shown below (**Table 4** and **Table 4b,** [National Resource Conservation Service, NRCS, 2011, Web Soil Survey]).

Table 4: Soil Description for Stony Terrace Escarpments

Depth in Inches	Texture	Use
0-12	Silt Loam	Save for topsoil
12-17	Silt Loam	Save for topsoil
17-24	Silt Loam	Save for topsoil
24-30	Silt Clay Loam	Store as overburden
30-42	Silt Clay Loam	Store as overburden
42-60	Gravelly Sandy Loam	Use for product

Table 4b: Soil Description for the Kearns Silt Loam, 3 to 6 Percent Slopes

Depth in Inches	Texture	Use
0-12	Silt Loam	Save for topsoil
12-17	Silt Loam	Save for topsoil
17-24	Silt Loam	Save for topsoil
24-30	Silt Clay Loam	Store as overburden
30-42	Silt Clay Loam	Store as overburden
42-60	Gravelly Sandy Loam	Use for product

The Stony terrace escarpments occur between 4,200 to 5,200 feet elevation. Mean annual precipitation is 14 to 18 inches. The soil is generally 100 percent of stony terrace escarpments, deep and well drained. The soil material ranges from silt, sandy loam to clay loam. The volume is made up of 40 to 70 percent of cobblestone and stones (NRCS, 2011, Web Soil Survey).

The Kearns silt loam, 3 to 6 percent slopes, soils occur between 4,400 to 4,700 feet elevation. Mean annual precipitation is 14- 16 inches. The soils map unit is generally 95 percent Kearns and similar soils and 5 percent minor components and organics. The soil is made up of alluvial fans. Depth class is more than 80 inches. Soils tend to be well drained and be non-saline (about 0.0 to 2.0 mmhos/cm). Soils may have up to

15 percent calcium carbonate. Potential vegetation includes Upland Loam (Mountain Big Sagebrush), NRCS, 2011, Web Soil Survey.

106.6. Plans for protecting and re-depositing soils

It is estimated that about 118 acres of mining disturbance will occur during Phase 1. At a 5 to 10 foot salvage depth, approximately 763,000BCY of growth media and organic soils will be salvaged from the area. During Phase 2 it is estimated that an additional 15 acres of mining disturbance will occur and approximately 139,000 BCY of growth media will be salvaged from the area. These volumes of growth media may be reduced if a portion of the soil is mixed with the underlying alluvium as part of the mining process.

To protect soils from erosion and soil loss, all stockpiles will be surrounded by erosion control fence. Growth media soils and vegetation (made up of mostly grasses and brush) will be removed just in advance of mining, using bulldozers, front-end loaders and haul trucks. Vegetation at the site will add negligible volume to the stockpiles.

Established growth media stockpiles will be broadcast seeded with a mixture of grasses to maintain slope stability and protect against erosion.

More detail on growth media stripping and protection is included in sub-section 109.3 below.

106.7. Existing vegetative communities to establish re-vegetation success

The project area ranges from 4,800 feet elevation at the west side to 5,100 feet on the east side. The mine area will be excavated in three sub-areas: the alluvial borrow, quartzite borrow and the railroad embankment borrow areas (**Figure 4**).

According to the NRCS range data for the North Western Salt Lake County (NRCS, 2011), which includes the study area (see **Figure 8**, Soils), vegetation production on the acreage to be mined ranges from 13,300 lbs/acre in a favorable year to 665 lbs/acre in an unfavorable year. The designated ecological site name is Upland Loam (Mountain Big Sagebrush).

Table 5: NRCS Potential Plant Species for Kearns Silt Loam and Stony Terrace Escarpments Soil map Units

Scientific Name	Common Name
Penstemon eatonii	Firecracker penstemon
Castilleja chromosa	Early Indian Paintbrush
Achillea millefolium	White Yarrow
Lolium perenne	Perennial Ryegrass
Stipa hymenoides	Indian Rice Grass
Sporobolus cryptandrus	Sand Dropseed
Elymus lanceolatus ssp psammophilus	Streambank Wheatgrass
Pascopyrum smithii	Western Wheatgrass
Poa secunda	Sandberg Bluegrass
Koeleria macrantha	Junegrass
Elymus trachycaulus ssp trachycaulus var San Luis	Slender Wheatgrass
Stipa viridula	Green Needlegrass
Lupinus caudatus Var. utahensis	Tailcup Lupine
Atriplex canescens	Four-wing Saltbush
Chrysothamnus nauseosus	Rubber Rabbitbrush
Atriplex confertifolia	Shadscale
Artemisia tridentata Var. tridentate	Big Sagebrush
Prunus virginiana	Chokecherry
Quercus x pauciloba Rydb. (pro sp.) [gambelii x turbinella]	Hybrid Oak

The list covers plant species found in the Oquirrh Mountains area, and parts of Salt Lake County. There are very few trees located on the subject property and they are all Gamble Oak. On November 4 and 5, 2010, a URS Environmental Scientist visited the site and observed the plant species growing at that time of the year (see Ecological Baseline Report in **Appendix B**). Those species observed during the site walk are shown in **Table 5a**.

A vegetation survey was conducted along several transects across the site by the URS Environmental Scientist, URS 2011, Ecological Baseline Report. The report shows the estimate of live canopy cover of weeds, grasses, low shrub and tall shrub by species. The vegetation survey was conducted on ten, 200-foot transects, spread randomly across the project area. The orientation of each transect was determined by using the results of a random number generator (Haahr, 1998) that would select a number between zero and 360. Transects were reviewed to ensure a proportional representation to the different vegetation communities existing on the site. In some cases, the location and/or orientation of transects were adjusted to ensure representative coverage of the four vegetation communities based on the spatial area of each community. Weeds and barren areas are not included in **Table 5a**.

A total of 25, 1-meter square, vegetation plots were recorded along each transect. For each plot, plant species were identified and the percent coverage, including bare ground, was estimated. The Average Percent Bare Ground results are figured by averaging the bare ground observed for each of 25 plots along transects in the respective vegetation community and then averaging those results. Refer to **Appendix B** for the Average Bare Ground calculations. The bare ground is not calculated for the tall shrub vegetation community because the field data gathered for this community only includes the number and species of tall shrubs. The low growing vegetation within the tall shrub transects closely resembles that in the grassland community. The percent bare ground very close to the grassland bare ground, except that there is approximately 40 percent coverage comprised of the overstory of tall shrubs.

Table 5a: Plant Species observed by URS at the mine site on November 4 and 5, 2010

Common Name	Scientific Name	Form	% Percent Cover
Arrowleaf balsamroot	*Balsamorhiza sagittata*	Grass	1.58
Big sagebrush	*Artemisia tridentate*	Low Shrub	5.95
Big galleta[1]	*Pleuraphis rigida*	Grass	7.81
Cheatgrass[1]	*Bromus tectorum*	Grass	11.69
Crescent milkvetch	*Astragalus aniphioxys*	Grass	0.09
Gambel oak	*Quercus gambelii*	Tall Shrub	10.00
Great Basin wildrye[1]	*Leymus cinereus*	Grass	12.87
Indian ricegrass	*Achnatherum hymenoides*	Grass	0.96
Kentucky bluegrass[1]	*Poa pratensis*	Grass	24.12
New-Mexican Locust	*Robinia neomexicana*	Low Shrub	NA[2]
Rabbitbrush	*Chrysothamnus nauseosus*	Low Shrub	9.68
Russian olive	*Elaeagnus angustifolia*	Tall Shrub	5.00
Shadscale	*Atriplex confertifolia*	Low Shrub	5.95
Shrub live oak	*Quercus turbinella*	Tall Shrub	NA[2]
Silver sagebrush	*Artemisia cana*	Low Shrub	0.56
Western wheatgrass	*Pascopyrum smithii*	Grass	NA[2]

[1]The percent cover is based on an average of the 10 transects surveyed (see full report in **Appendix B**)
[2] Plant species observed on site, but not observed in any of the randomly generated transect locations

106.8. Depth to groundwater, overburden material, and geologic setting

Groundwater

Two water wells are located within ½ mile radius of the Bonneville Borrow Area. A map using well location data provided from the Utah State Division of Water Rights is attached as **Figure 7**, verifying the location of these existing wells. The closest well to the Bonneville Borrow Area is owned by Magna Water Company. It is located 1,800 feet from the Southeast corner of the permit boundary, and the head of the well is about 220 feet lower than the planned level of excavation of the pit. This water level is at least 300 feet below the lowest planned level of mining in the Bonneville Borrow Pit (4,800).

The other well located within ½ mile radius of the Bonneville Borrow Area is owned by Kennecott Land Company. The well is just northeast the Magna Water Company well 610 feet. The head of this well is approximately 222 feet lower than the planned excavation of the pit. Quarry operations are not anticipated to adversely affect groundwater flows in the area. This in addition to information in Section R467-109.1, indicated that groundwater is not likely to be encountered in the project area during mining, and depth to ground water is expected to be well below the maximum extent of mining.

Overburden Material

A surficial layer of clayey organic soils, estimated to range from less than 5 to 10 feet thick, will be stripped from the alluvial borrow area. Overburden material will be mined, stored and stockpiled as growth media. The soils cover the surface of the terrace and include some recent flood and debris flow deposits. The volume required to be stripped, stockpiled, and used for reclamation is estimated to range from 500,000 to 1,000,000 CY, for both Phase 1 and Phase 2 construction. This overburden will be stripped with dozers and scrappers and placed in stockpiles located around the project area see **Figure 4a**. The overburden stockpiles will be hand broadcast seeded with native grasses to control erosion for the duration of the stockpile. It will be kept there until interim and final reclamation begins and then it will be placed on spent mine area.

Geology of the Area

The Bonneville Borrow Area is located at the foot of the northern Oquirrh Mountains, west of the town of Magna, Utah. The Oquirrh Mountains have a southerly trend along the Salt Lake County and Tooele County border, and are composed primarily of

Pennsylvanian and Permian sandstone [including quartzitic sandstone] and limestone of the Oquirrh Group, intruded and overlain by Tertiary intrusive and volcanic rocks (Hintze et al., 2000). The subject property is within the Bingham mining district, with most ore associated with the Bingham stock, a mid-Tertiary quartz monzonite intrusive body (Stokes, 1986). The majority of the Bonneville Borrow Area is composed of quaternary alluvial and fan deposits, consisting of poorly to moderately-sorted clay- to boulder-sized sediment (clays, silts, sands, gravels, cobbles, and boulders) deposited principally by debris flows, floods, and streams (Solomon et al., 2007). The southern end of the Bonneville Borrow Area is characterized by thin- to medium-bedded quartzite of the Kessler Canyon Formation of the Oquirrh Group (Solomon et al., 2007). Although the Kessler Canyon Formation can consist of calcareous and dolomitic sandstone and dolomitic limestone interbedded with quartzite, recent geologic mapping conducted at the subject area found little to no evidence of limestone or dolomite interbedded with the quartzite see **Figure 9**.

106.9. Location and size of borrow and waste stockpiles, tailing, and treatment ponds, and discharges

Waste/Overburden Stockpiles

Raw materials consist of quartzite, sand and gravel that will be removed from the quartzite borrow area, the alluvial borrow and the railroad embankment area. Other than the estimated 6 feet of growth media in the alluvial borrow area set aside for reclamation purposes, all rock material removed from the site will be used to create drainage blanket, road base, bridging, embankment, riprap and structural fill. No waste rock is generated.

Material Stockpiles

There are several stockpiles of sorted and sized rock products stored on site. The general, current and future locations of the stockpiles are shown on **Figure 4a**. A list of stockpiles and maximum expected volume of each can be found in **Table 6** below.

Table 6: Stockpiles and Estimated Maximum Volumes for the Bonneville Borrow Area

Stockpile Material	Maximum Volume
Drain Rock	77,000 CY
Coarse Filter	77,000 CY
Fine Filter	77,000 CY

Tailings

No Tailings will be produced at this mine.

Water Storage

Water for dust suppression, crushing and screening will be hauled or piped to the quarry from a nearby water source provided by the owner. Water will be stored in a tank on site until ready for use. Water will be used for dust control in the crushing, sand and gravel processing and on haul roads. It will be absorbed into the ground leaving no excess water for run-off. However in the unlikely event that run-off from the crusher/screening area occurs, water will be directed to the bottom of the alluvial borrow area, which will act as a storm water retention basin.

Any storm water run-off coming from the affected lands will be collected at the bottom of the alluvial borrow area and within the quarry confines, which at a minimum will be sized for the 10-year, 24-hour event. Stormwater run-off is further discussed in Section 109 and in **Appendix E,** SWPPP.

Discharges

Currently any water used for dust control or processing will be hauled in from off-site sources. No waste water discharges will occur at the site.

R647-4-107. Operation Practices

As required, the relevant Operation Practices stipulated in R647-4-107 will be followed.

R647-4-108. Hole Plugging Requirements

There are no plans for future resource exploration drilling within the permit area. If drilling for any other reason than blast hole drilling is planned in the area, Kennecott will notify DOGM and the following procedures will be employed.

- Drill holes shall be properly plugged as soon as practical and shall not be left unplugged for more than 30 days without approval by DOGM.

- Dry holes and non-artesian holes that do not produce significant amounts of water may be temporarily plugged with a surface cap to enable Kennecott to re-enter the hole for the duration of set operations.
- Surface plugging of drill holes outside the mine area shall be accomplished by setting a nonmetallic permaplug at a minimum of five (5) feet below the surface, or returning the cuttings to the hole and tamping the returned cuttings to within five (5) feet of ground level. The hole above the permaplug of cuttings will be filled with a cement plug. If cemented casing is to be left in place, a concrete surface plug may not be required if a permanent cap is secured on top of the casing.
- Drill holes that encounter water, oil, gas or other migratory substance and are 2.5 inches or greater in surface diameter will be plugged in the subsurface to prevent the migration of fluid from one stratum to another. If water in encountered, plugging shall be accomplished as outlined below.
- If artesian flow (i.e., water flowing to the surface from the hole) is encountered during or upon cessation of drilling, a cement plug will be placed to prevent water from flowing between geologic formations and at the surface. The cement mix will consist of API Class A or H, with additives as needed, and will weigh at least 13.5 lbs/gal. It will be placed under the supervision of a person qualified in proper drill hole cementing of artesian flow.
- Artesian bore holes will be plugged as described prior to removal of drilling equipment from the well site.
- If the surface owner of the land affected desires to convert an artesian drill hole into a producing and/or monitoring well, the landowner will provide written notification to DOGM accepting responsibility for the ultimate plugging of the drill hole.
- Holes that encounter significant amounts of non-artesian water shall be plugged by: 1) placing a 50-ft cement plug immediately above and below the aquifer(s) or filling from the bottom up (through the drill casing) with a high grade bentonite/water slurry mixture. The slurry shall have a March Funnel viscosity of at least 50 seconds per quart prior to the adding of any cuttings.

R647-4-109. Impact Statement

109.1. Surface and ground water systems

Surface Water

No perennial streams or intermittent waters have been or are expected to be impacted by the mining operations at the Bonneville Borrow Area. Surface water environmental Permitting Position Statement is included in **APPENDIX E.** Any precipitation and/or run-off that enters the borrow area from sheet flow, which enters the borrow area from the hillside above will be contained within the borrow area(s). Because this proposed Bonneville Borrow Area is small and has no defined channels, a generalized run-off calculation was developed for the active mine for the 25-year, 24 hour storm event using SCS TR-55 method with a type II rainfall distribution. The 25-yr, 24 hour storm depth for the Salt Lake City County is 2.17 inches. Results are summarized in **Table 7** below. Delineated drainage basins are shown in **Appendix E,** SWPPP.

Table 7: Runoff Rate and Volume Estimates for the 25-year, 24-hour Storm Event

Location	Watershed Area (Acres)	Time of Concentration (hrs)	Watershed Curve Number	Peak Discharge (cfs)	Estimated Runoff Volume (Ac-Ft)
A-1	147.18	0.2	91.0	255	253
A-2	28	0.1	91.0	56	56
A-3	48.8	0.1	91.0	98	97

Modeling assuming the 25-year, 24-hour precipitation event (with a depth of 2.17 inches) , as derived from the NOAA Atlas 14, Volume 1, Version 5, Magna, Utah, Point Precipitation Frequency Estimates (National Weather Service, 2011)

Once inside the Borrow area, water disperses across the flat bottom floor. Areas used for stockpiles, crushers and processing facilities are graded higher than surrounding areas to prevent contamination of stormwater within the borrow area. In addition, the working platforms that makes up the borrow area floor (see **Figure 7a)** are bermed to meet MSHA regulations, and act as a containment area where run-off remains until it soaks into the ground or evaporates.

Two water quality ponds were sized in order to settle eroded sediment transported from stormwater runoff during grading, construction and normal operating activities, shown in the SWPPP, **Appendix E**.

The two water quality ponds were based on a minimum 3,600 cubic feet of storage per acre of contributing area plus an additional 800 square feet per acre of contributing acre adjustment. Geometry of each pond was designed with a longitudinal inlet to outlet length double the width for particulate settling time. Inlet and outlet dampening structures are also in place to maximize maintenance. Pond 1 (the largest, northern pond) was estimated to be able to hold approximately 14.9 acres. Pond 2 (the smaller, southern pond) was estimated to be able to hold approximately 7.2 acres. Both ponds are required to have a minimum available water depth of 3 feet to allow settling and sedimentation accumulation.

Precipitation that is intercepted by the haul roads and access roads is diverted into roadside ditches until it flows into the borrow area. If erosion or sediment is observed on lands, Kennecott commits to using appropriate water and erosion control measures. This includes, but not limited to: properly installed filter fencing, straw bale check dams, dirt berms, log berms, small (<0.1 acre-foot) sediment retention sumps, and rock check dams see **Figures 5b** and **5c**.

All fuel, oil, gas and solvents will be stored in approved tanks, in lined retention areas located on the west side of the project area to prevent pollution to storm water run-off. In addition three settling ponds sized for the 100-year, 24-hour event will be constructed to contain any sediment or pollution laden waters generated at the mine. These protective measures are discussed more thoroughly in the SWPPP, contained in **Appendix E**.

Ground Water

The elevation of the groundwater is estimated to be 4,070 feet. The quarry floor will be about 4,800 in elevation, so there will be about 730 feet in vertical separation between the quarrying activities and the groundwater as shown of **Figure 4a**. No groundwater has been encountered during current borrow exploration activities. Ground water environmental Permitting Position Statement is included in **APPENDIX E.**

The major activities on the mine property that could impact groundwater if residues were to reach the resources are: 1) blasting (which will be relatively minimal); 2) presence of diesel fuel, lubricants, etc. used in the heavy equipment used at the mine,

3) human wastes, which are processed through chemical toilets, which are serviced regularly. In summary:

- Good housekeeping practices and careful operating procedures are used to minimize fuel and lubricant spills. Fuel and lubricants are stored in above ground tanks that have secondary containment that protect against spills.
- The quantities of blasting materials used create negligible quantities of nitrates that, in the unlikely event that they reached the groundwater would be well below water quality limits.

109.2. Wildlife habitat and endangered species

The project area ranges from 4,800 feet elevation at the west side to 5,100 feet on the east side. The mine area will be excavated in three sub-areas: the alluvial borrow, quartzite borrow and the railroad embankment borrow areas.

Maps in the Utah Conservation Database Center (UCDC), located at http://dwrcdc.nr.utah.gov/ucdc/, (UCDC, 2011), indicate the permit area could contain significant winter/spring habitat for mule deer and elk, but not for moose or pronghorn.

The UCD website lists five Threateneed or Endangered (T&E) species that are present in Salt Lake County and 19 Species of Special Concern (SPC) that could potentially be found in the area of the Bonneville Borrow Site. The T&E species are listed below in **Table 8**. Kennecott has confirmed that none of the T&E species or the SPC species listed are found within the permit area.

Table 8: Threated and Endangered Species of Salt Lake County

Common Name	Scientific Name	Status[1]	Habitat present at Bonneville Borrow Area
Vegetation			
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	T	No – to dry
Wildlife			
Least chub	*Iotichthys phlegethontis*	C	No – to high, no bodies of water
Greater sage-grouse	*Centrocercus urophasianus*	C	No – sagebrush is sparse
June sucker	*Chasmistes liorus*	E	No – to high, no bodies of water
Yellow-billed cuckoo	*Coccyzus americanus*	C	No – to dry

[1] T = Threatened, E = Endangered, and C = Candidate

URS Corporation was requested to perform a study of the area to see if any T&E or SPC species are found on the permit area. On November 4 and 5, 2010, URS Environmental Planner conducted an inventory of the area and found no T&E species, SPC or habitat conducive to T&E species. In addition, URS did not observe any white-tailed prairie dogs or suitable habitat for sage grouse which are Utah Species of Concern. A copy of the report is attached in **Appendix B**.

109.3. Existing Soil and Plant Resources

After Phase 1 of mining approximately 763,000 BCY of growth media will be stored from the mining operation for reclamation. A total volume of approximately 902,000 BCY of growth media will be available for reclamation once the mine is fully developed as shown in **Figure 4a-4c**.

All growth media/topsoil stockpiles will remain until reclamation is ready to begin. All growth media piles will be placed at angle of repose and a flat to slightly arched top. To protect soils from erosion and soil loss, all stockpiles will be surrounded by erosion control fence with an interior ditch. The ditch will catch and retain any soil that sloughs off the stockpile, and the erosion control fence will prevent contamination and erosion from storm water.

Growth media stockpiles will be constructed in multiple areas within the permit area to reduce handling (see **Figure 4a**) over the span of the mining operations, ultimately covering approximately 16.7 acres.

Substitute growth media (topsoil) material may be developed to augment the growth media resources available. This substitute material would include a mix of natural or crushed fines, small rock, and pit run material; imported manure and/or organic material matter (i.e., agriculture field refuse, wood chips, bran or wheat chaff); fertilizer to enhance fiber breakdown. This material would be stored and spread separate from the actual growth media resources.

The newly stockpiled soil will be seeded in the fall of each year with a quick-growing cover of grass and legumes in order to minimize erosion. The seed mix, listed in **Table 9**, will be broadcast at a rate of 14.5 lbs/acre PLS (pure live seed).

Table 9: Seed Mix for Growth Media Stockpiles

Seed Species		PLS Pounds Per Acre
Scientific Name	**Common Name**	
Elytrigia intermedia	Intermediate Wheatgrass	2.5
Psuedoroegneria Spicata	Bluebunch Wheatgrass	2.5
Achantherum hymenoides	Indian Rice Grass	2.00
Elymus elymoides	Bottlebrush Squirreltail	1.50
Poa sandbergii	Sandberg Bluegrass	1.50
Medicago sativa	Alfalfa	0.75
Agropyron cristatum	Crested Wheatgrass	0.5
Hedysarum boreale	Northern Sweetvetch	1.25
	Total	**12.50**

PLS = pure live seed

The size of the area stripped in front of the mining and storage areas will be minimized to limit dust generation and the establishment of noxious weeds. At the same time, the stripped area will be large enough to allow equipment to operate on the stripped lands, and contain within the stripped area all fly-rock that could occur from blasting. Please see subsections 106.5 and 106.6 for more information about growth media.

All areas disturbed by Kennecott (the bonded areas) will be reclaimed at the end of mining by regrading (ripping compacted surfaces where necessary), topsoiling, and re-seeding as described in Section 110, with the goal of creating a self-renewing, perennial vegetation cover similar to native conditions.

109.4. Slope Stability, Erosion Control, Air Quality, Public Health, and Safety

Slope Stability

The rock at the Bonneville Borrow Area is made up of a massive quartzite deposit of Pennsylvanian and Permian age, fan, lake spit and beach deposits. During mining, all active high walls in the Quartzite Borrow area will be maintained at 40-foot high walls set back on with 20-foot benches. The south face on the east side of the rail cut will be mined at a 1:1(H:V). The north facing slope will be mined at a 2.5:1(H:V), allowing for placement of growth media. The Alluvial Borrow area overall slope will be mined at a 2.5:1(H:V). Kennecott inspects all high walls two times a month. A more extensive high wall inspection is conducted yearly with the MSHA inspector. A factor of safety of 1.25 or greater will be maintained at all times on slope stability. If problems occur with the

planned 1:1(H:V) slope, in the Quartzite Borrow area, a further geologic study will be performed to determine a safe slope configuration.

Refer to R647-4-110.2, Reclamation Plan – High walls, for further information on slope stability during reclamation.

Erosion Control

There are no defined water channels within the area planned for disturbance. However, the hillside being mined does shed water into the quarry area during precipitation events. Operations will be performed to control water and erosion in disturbed, bonded areas. The quarry floor (see **Figures 4a-4c**) is surrounded by a MSHA safety berm. Any erosion or sediment produced on mine-affected lands will be contained within the quarry.

The Alluvial quarry floor will be sloped to the southwest as a storm water control measure (toward the quarry face). This negative slope will cause all stormwater entering the quarry to remain there until evaporated or absorbed into the ground. Until the quarry face gets fully develop, refer to **Appendix E,** SWPPP.

Erosion of dirt and dust from roads will be controlled through the application of chemical treatment such as magnesium or calcium chloride, graveling the road, and grading it to have sufficient crown and drainage ditches to the side so that the water does not pond. Sufficient turn-outs from road ditches will be provided to allow water collecting on the road to be released in a non-erosive manner. Erosion protection for soil stockpiles is addressed under soils, above.

Air Quality

Kennecott has applied for an Air Quality permit through the State of Utah, Department of Environmental Quality, Division of Air Quality (DAQ). A copy of the NOI filed with DAQ is attached. A copy of the final AO permit will be provided to the Division.

Public Health and Safety

Kennecott will minimize the hazards for public safety and welfare during operations. These measures include:

- No mining shaft or tunnels exist on site. All buildings, silos, conveyors, and other facilities and equipment are signed to discourage unauthorized or accidental entry in accordance with MSHA regulations.

- A gate at the single access road on the northwest corner of the quarry will be locked when the site is not operating. The perimeter will be fenced to prevent unauthorized entry into the permit area during both operating and non-operating hours.
- Trash, scrap metal, wood, and extraneous debris will be disposed of in marked containers that are picked up monthly and disposed of at a Salt Lake County Solid Waste Transfer Facility.
- Although none are planned, any exploratory or other drill holes will be plugged and/or capping of as set forth in Rule R647-4-108.
- Appropriate warning signs will be located at public access points, and every 300 feet along the north and east boundary.
- All deleterious or potentially deleterious material, such as fuel tanks and supplies of lubricants and oils, are kept in one bermed storage area to minimize and control adverse environmental effects.
- Used lubricants and hydraulic oils are collected in designated above ground tanks and drums and held for collection by used oil distributors who process it into burner fuels.

- Blasting will follow industry standard for public safety. A pre-blasting survey has been completed, documentation is available at KUC.

R647-4-110. Reclamation Plan

110.1. Current Land Use and Post – Mining Land Use

Current land uses of the property at the Bonneville Borrow Area include mining of sand and gravel and wildlife habitat. Historical use of the property included livestock grazing.

Between Phase 1 and 2 of mining there will be a period where no mining occurs. During this period temporary reclamation measures will be instituted on portions of the disturbed area. Interim reclamation will consist of surface shaping, erosion control, growth media and seeding placement. Seeding would also be required on any remaining stockpiles.

Surface shaping will generally occur as a part of the excavation process, however other non-excavated surfaces will also have growth media application including:

North face – east of the railroad cut

North face above the existing railroad grade, west of the quartzite borrow area

Excavated surfaces that will be shaped and have growth media applied include:

North face – west of the railroad cut

All alluvial area excavation surfaces (with the exception of the designed road providing access to the existing railroad embankment)

The access road from the alluvial borrow to the quartzite borrow will be left in place to allow access for Phase 2 quarry activities.

After operations at the Bonneville Borrow area are completed, the land will be restored to the anticipated post mining land use developed by KUC during the period of operations. Post mining land use is anticipated to be for wildlife habitat. At this time this LMO reflects a return to current baseline conditions. After Phase 2, borrowing activities will lower the surface of the quartzite and alluvial borrow areas. The quartzite borrow will remove another 50 feet of material within the Phase 1 disturbance limits. As in Phase 1, the north face west of the rail cut will be mined at a 2.5:1 (H:V) slope, while the south face east of the cut will continue at a 1:1 (H:V) slope. Growth media to a depth of 2 feet will be spread on the north face west of the cut and the pit bottom after mining. The south face east of the rail cut will be left in a stable configuration. At a later date, a 2.5:1 (H:V) slope could be placed along the south face.

The road from the quartzite borrow to the crushing plant will be reshaped after mining and growth media applied. The reclaimed road will convey surface water flows from the quartzite borrow into the alluvial borrow area. Water bars and energy dissipation features will be constructed as part of final reclamation.

South from the railroad embankment borrow, along the existing rail grade, a north facing cut slope will be reclaimed by filling at a 2.5:1 (H:V) slope with suitable growth media.

The road constructed to access the existing abandoned railroad embankment will be reshaped after the embankment is removed and growth media will be applied. The reclaimed road will convey surface water flows from the railroad embankment borrow into the alluvial borrow area. Water bars and energy dissipation features will be constructed as part of final reclamation.

In the alluvial borrow area the quarry bottom will be lowered an additional 110 feet continuing to the northwest. As in Phase 1, final slopes will be mined at a 2.5:1 (H:V) slope and growth media applied.

During operations the alluvial borrow was slightly sloped to the southwest as a surface water control feature. At closure the floor slope will be re-directed towards the northeast edge of the borrow area into the existing drainage via a small drainage ditch. The final location, size and other features of the ditch will be designed during final engineering.

110.2. Reclamation of Road, Highwalls, Slopes, Leach Pads, Dumps, Etc.

Roads

Approximately 5,000 feet of roads, 50 feet in width, with a 3.5 feet high trapazodial berm with 2:1 (H:V) side slopes on fill section, will be required to fully develop the Bonneville Borrow area within the permitted limits. Upon completion of mining activities, the main access road into the quarry and all other roads that services the stockpiles and the crusher are anticipated to be ripped, graded to blend with the planned final contours, covered with topsoil and drill/broadcast seeded as described in reclamation of benches and quarry floor.

Highwalls

As mining progresses in the alluvial borrow area to the west and north in 25 foot increments, sidewalls will be graded to an overall slope of 2.5:1(H:V). In the Quartzite Borrow area mining will progress in a southwest direction, sidewalls will be graded 1:1(H:V) on the south face; with a constant slope to eliminate rockfall, benches will be covered with growth media and seeded, and on the east side of the rail cut, and a 2.5:1(H:V) on the north face to reach their final configuration. If mining were to cease prior to full excavation of the quarry, those high walls disturbed by Kennecott would be reclaimed to the 2.5:1(H:V) configuration noted above.

No significant areas are available for concurrent reclamation. Alternative final reclamation techniques such as rock staining and vegetative view breaks will be evaluated over time and incorporated as appropriate into the final reclamation plan.

Slopes

The quarry floor will be mined down to approximately 4,800 feet in elevation.

All slopes and floors within the disturbed, bonded area will be ripped on the contour to relieve compaction and create a better seed bed (this is discussed further in Sub-section 110.5 below).

The quarry floor will be graded to a 1 percent slope that will re-direct towards the northeast edge of the borrow area into the existing drainage via a small drainage ditch.

Impoundments, Pits, and Ponds

The quartzite and alluvial borrow areas will not be backfilled except for the replacement of 2 feet growth media on the floor of the quarries. The alluvial borrow area will be reclaimed with 2.5:1(H:V) minimum slope with no high walls exposed and reclaimed with a 1 percent slope re-direct towards the northeast edge of the borrow area into the existing drainage via a small drainage ditch. The quartzite borrow area, the north face west of the rail cut will be reclaimed at a 2.5:1(H:V), while the south face east of the cut will be left at a 1:1(H:V). The south face east of the rail will be left in a stable configuration. No impoundments of ponds will be left that require maintenance or monitoring.

The settling ponds constructed along the north edge will be backfilled upon reclamation using overburden materials salvaged over the life of the quarry. This will be done as part of grading operations in this area. The reclaimed settling ponds will be topsoiled and revegetated in the same manner as the rest of the mine area, as explained under Section 110.5 below.

Drainages

No drainages will be constructed. The native land outside the perimeter of the quarry, crusher and screen plant is on gravelly, vegetated outwash plain and is subject to overflow rather than channelized flow.

The areas will be graded to an approximate 1 percent slope that will re-direct towards the northeast edge of the borrow area into the existing drainage via a small drainage ditch.

Dumps, Shafts, Adits, and Leach Pads

There will be no dumps, adits, shafts, or leach pads created during mining, thus none of these features will need to be reclaimed. The slope between the quarry floor and the crusher and screen plant area will be 2.5:1(H:V) or flatter to minimize erosion and will be seeded as explained in 110.5 below.

Drill holes

No drill holes outside those required for blasting are anticipated. If any drill holes are required, they will be plugged and sealed as described in R647-4-208 above. There will be no drill holes left open upon reclamation.

110.3. Surface Facilities to be Left

No structures will be left on site. All facilities will be removed and their footprints reclaimed. A list of typical structures to be removed and reclaimed (but not limited to) is included in **Table 10** below.

Table 10: Typical Surface Facilities to be Reclaimed

Typical Structure	Average Dimensions
Jaw Crusher	50' x 25' x 20'
Primary Screen	No primary screen
Grizzly Feeder	**Included in Jaw Crusher dim's**
Secondary Scalp Screen	20' x 40' x 20'
Secondary Crusher	20' x 50' x 20'
Reclaim Tunnel w/ Feeder	12' x 40' x 12'
Tertiary Scalp Screen	20' x 40' x 20'
Tertiary Crusher	20' x 50' x 20'
Tertiary Screens	20' x 40' x 20'
Quaternary Crushers	20' x 50' x 20'
Quaternary Screens	20' x 40' x 20'
Radial Stacking Conveyors	4 conveyors with 36" inch belt and 150' feet long
Thickener/Clarifier	60' dia. X 26'
Hydrocarbon Storage	**Listed Below:**
Propane Tank	gal
Fuel Tanks	gal on-road tank
	gal off-road tank
	gal gas tank
Oil Drums	Drums in Conex Storage Container

Total acreage for buildings, structures, pads and access roads at the site is 11 acres. All facilities will be demolished after salvaging metals and removing insulation, tile, etc. If any concrete is on-site, concrete will be broken up and buried on site. Other material will be hauled to, and disposed of in a licensed landfill.

110.4. Treatment, Location, and Deposition of Deleterious Materials

Potentially hazardous insulation, tile, and non-salvageable debris from demolition of structures will be removed to a licensed landfill. All tanks will either be removed to a licensed landfill upon reclamation, sold or relocated. The surety calculations contained in Section 113 assume these items are disposed of at the Salt Lake Valley Landfill, located in Salt Lake City.

All conveyors, crushers, screen, plants and other equipment used for mining and processing of aggregate will be removed upon reclamation or sold. The surety calculations contained in Section 113 assume these items are disposed of at the Western Metals Recycling Center in Salt Lake City.

110.5. Re-vegetation Planting Program and Topsoil Re-distribution

After final shaping and grading of the quarry floor and facilities area, slopes, and roads within the disturbed area, surfaces will be ripped and/or scarified on the contour to relieve compaction.

Soil Material Replacement

Topsoil and topsoil substitute material (described under Sub-section 109.3) will be spread on the quarry floor and plant area using self-loading scrapers to place soil, and a grader to spread the soil. Topsoil to a depth of 2 feet will be spread on the north face west of the cut and the pit bottom floor. Marked lath will be used to guide dozer operators to the correct topsoil depth. Growth media will be spread on the upper slope as far as practical. In addition, growth media will be placed at the toe of the cleaned slope to create a 2.5:1(H:V) surface for reclamation.

Seed Bed Preparation

Prior to spreading any topsoil or topdressing, stockpiles will be tested for organic matter, Nitrogen, Phosphorus, and Potassium. If these levels are low, composted manure will be applied to the solid or topsoil substitute after it is spread.

Topsoil will be laid down with a scraper, and if needed, composted manure at 10 ton/acre will be spread. All surfaces will be scarified along the contour with a road grader to assure mixing of the soil and manure to create consistent-textured soil and a roughened surface that will hold the seed and moisture for best germination.

Seed Mixture

Table 11 below provides the seed mixture that will be used in reclamation on all bonded, disturbed areas at the Bonneville Borrow Area that are 2.5:1(H:V) or flatter, including highwall benches. Drill and broadcast seeding rates would be the same.

Table 11: Reclamation Seed Mix for Bonneville Borrow Area

Common Name	Scientific Name	PLS Pounds/Acre
Small Burnette	*Sanguisorba minor*	1.5
White Yarrow	*Achillea millefolium*	0.2
Indian Rice Grass	*Stipa hymenoides*	1.0
Western Wheatgrass	*Pascopyrum smithii*	2
Intermediate	*Agropyron intermedium*	3
Great Basin Wildrye	*Elymus cinereus*	3
Four-wing Saltbush	*Atriplex canescens*	2
Rubber Rabbitbrush	*Chrysothamnus nauseosus*	0.25
Big Sagebrush	*Artemisia tridentata Var.*	0.1
Forage kochia	*Bassia prostrate*	0.5
Pacific aster	*Symphyotrichum chilense*	0.1
Palmer's penstemon	*Penstemon palmeri*	0.5
	Total Rate to be Seeded	14.05

Seeding Method

The quarry floor, plant areas, roads on flat or gently sloping surfaces will be seeded using a range-type drill seeder and/or broadcast on the surface.

Fertilization

Prior to spreading any topsoil or topdressing, stockpiles will be tested for organic matter, Nitrogen, Phosphorous, and Potassium. If the levels are low, 10 tons of composted manure per acre will be applied to the soil or topsoil substitute after it is spread. Soil amendment quantities will be approved by DOGM prior to application.

Other Re-vegetation Procedures

None

R647-4-112. Variance

No variances are anticipated at this time.

R647-4-113. Surety

The reclamation surety calculations are contained in **Appendix F**. A Summary of the estimated costs of reclamation is included below.

Subtotal Demolition and Removal	$120,076.00
Subtotal Backfilling and Grading	$3,662,369.00
Subtotal Revegetation	$148,000.00
Direct Costs	$3,930,445.00
Indirect Costs	
Mob/Demob	$393,045.00
Contingency	$196,522.00
Engineering Redesign	$98,261.00
Main Office Expense	$267,270.00
Project Management Fee	$98,261.00
Subtotal Indirect Costs	$1,053,359.00
Total Cost 2010	$4,983,804.00
Escalation	$306,292.00
Reclamation Cost Escalated (for 118 acres disturbed)	$5,290,096.00

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URS, 2011. Phase I Feasibility Report, Appendix A.2, Borrow Area Development, Kennecott Tailings Expansion Project (TEP). July, 2011.

Do Not Disturb Areas

Existing Power Line

Haul Road

Magna

Alluvial Borrow Area

1% Slope

Water Quality Pond 1

Settling Pond

Drain Rock

Stockpile

Sediment Trap

Proposed Fines Discharge to Tailings Pipe Line

Coarse Filter

Stockpiles

Fine Filter

Proposed Powerline

Crushing and Screening Plant

Power Line to be Abandoned

Contractor Laydown Area (Final Location to be Determined by Contractor)

Water Quality Pond 2

Proposed Power Line

Quartzite Borrow Area

Aerial Source: ImageService http://image.agrc.utah.gov/ArcGIS/rest/services/AGRC_Aerial_Photography_Color_HRO_2009/ImageServer

Path: T:\Kennecott\Bonneville Crusher Permit\05_Data\GIS\Maps\DOGM Permit Application\Updated_Feb2012\Fig4A_KUC_BorrowArea_InterimPhase1.mxd

- Intermittent Stream
- Phase 1 Haul Road
- Cross Section (See Following Page for Detail)
- Proposed "V" Ditch
- Flow Direction
- 1% Slope (Pit Floor)
- Growth Media Stock Pile (16.7 acres)
- Quartzite Stockpile
- Interim Reclamation Area
- Mine Limits

400 0 400 800 Feet

Title: Mine Plan Map, Interim Excavation Phase 1 Borrow

Bonneville Borrow Area
DOGM Permit Application

Proj No: 24585223

Figure: 4A

Date: March 2012

RioTinto

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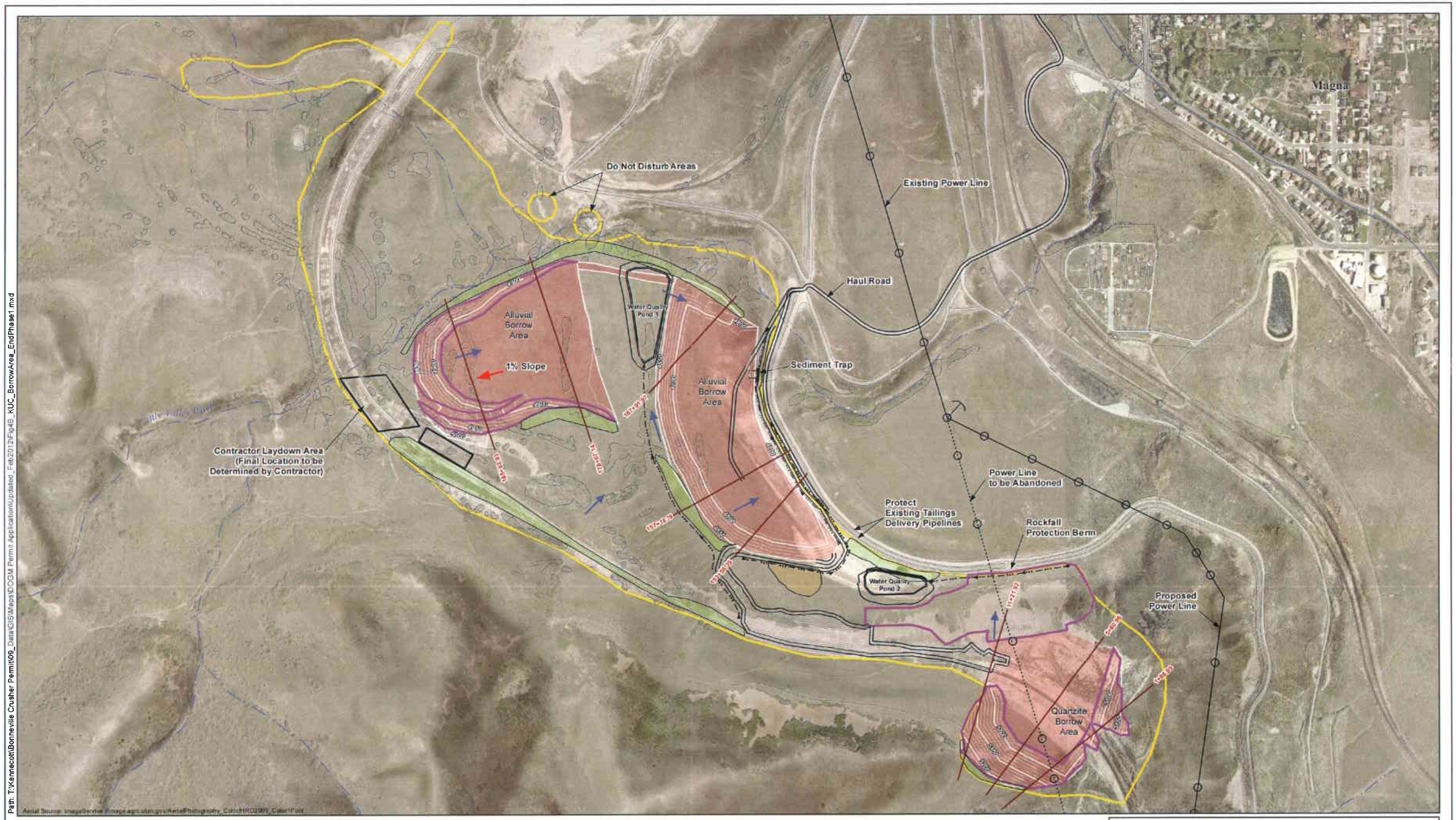

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Aerial Source: ImageServer (image.atgc.utah.gov/AerialPhotography_Color/HRO2009_Color1Foot)

- Intermittent Stream
- Phase 1 Haul Road
- Cross Section (See Following Page for Detail)
- Proposed "V" Ditch
- Flow Direction
- 1% Slope (Pit Floor)
- Growth Media Stock Pile
- Quartzite Stockpile
- Phase 1 Disturbance Area
- Phase 1 Reclamation Area
- Mine Limits

400 0 400 800 Feet

Title: End Phase 1 Borrow

Bonneville Borrow Area
DOGM Permit Application

Proj No: 24585223
Figure: 4B
Date: March 2012

RioTinto

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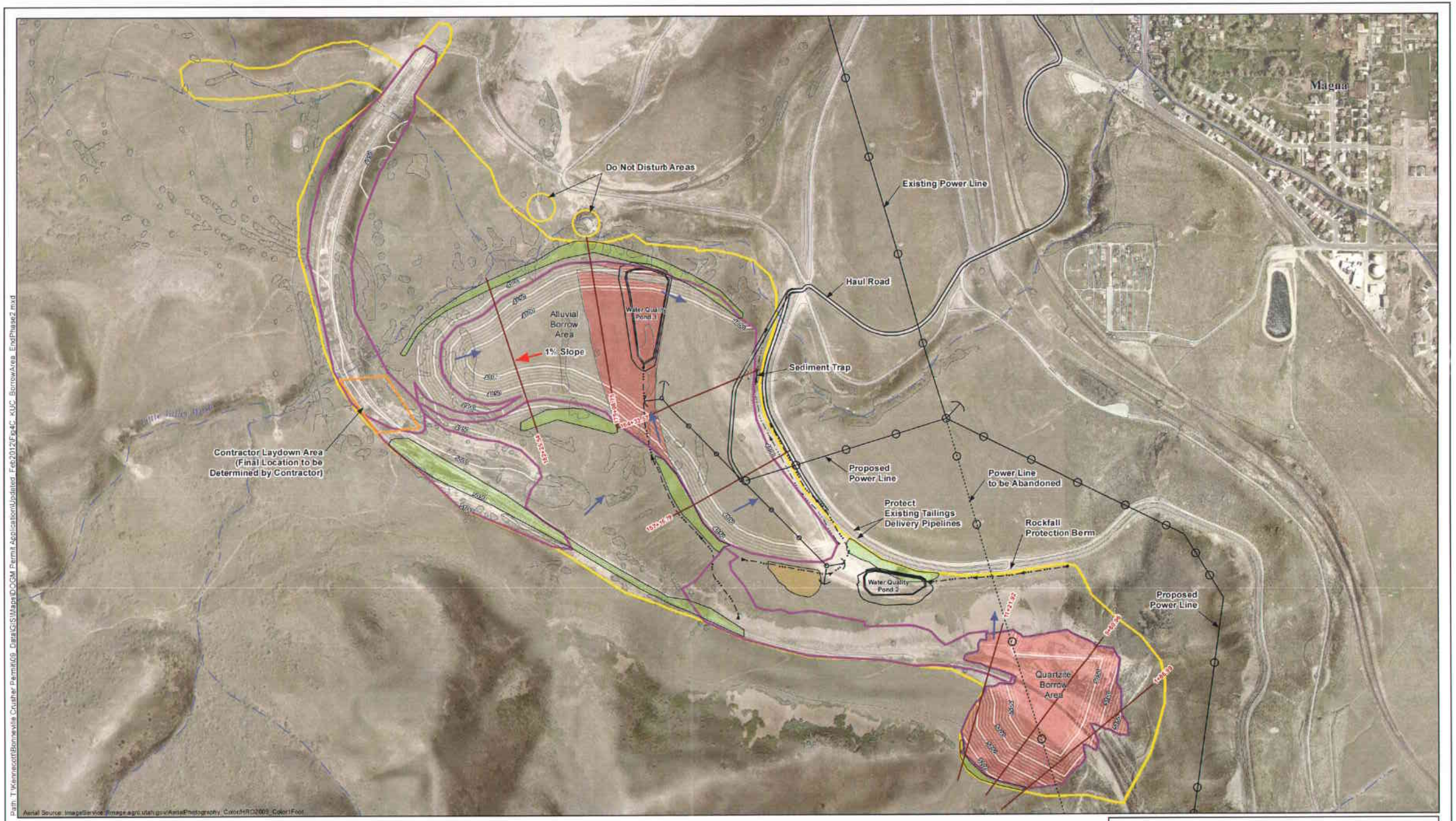

- Intermittent Stream
- Phase 1 Haul Road
- Cross Section (See Following Page for Detail)
- Proposed "V" Ditch
- Flow Direction
- 1% Slope (Pit Floor)
- Growth Media Stock Pile
- Quartzite Stockpile
- Phase 2 Disturbance Area
- Phase 2 Reclamation Area
- Mine Limits

400 0 400 800 Feet

Title: End Phase 2 Excavation

Bonneville Borrow Area
DOGM Permit Application

Proj No: 24585223
Figure: 4C
Date: March 2012

RioTinto

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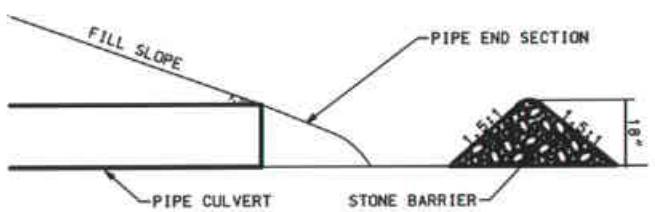
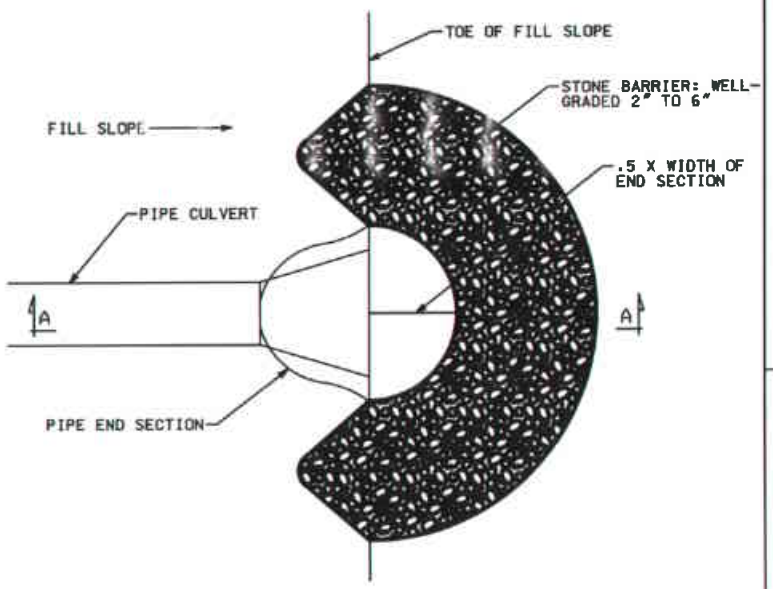
PIPE INLET BARRIER



SECTION A-A



PLAN VIEW

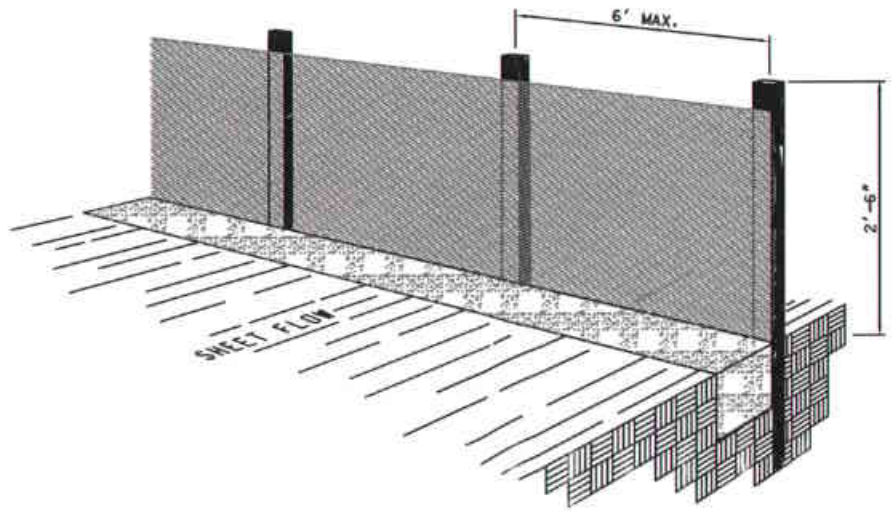
NOTES FOR PIPE INLET BARRIER:

1. PLACE PIPE INLET BARRIERS AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
2. MAINTAIN A PROPERLY FUNCTIONING SEDIMENT BARRIER THROUGHOUT CONSTRUCTION.
3. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.
4. WHEN SURROUNDING AREAS HAVE BEEN SEEDED AND MULCHED, REMOVE THE STONE BARRIER BY SPREADING THE STONE ALONG THE CUT DITCH.
5. AN 18" MINIMUM DIAMETER FIBER ROLL MAY BE USED AS A SUBSTITUTE FOR THE STONE BARRIER. STAKE AS SHOWN ON STD DRW EN 1.

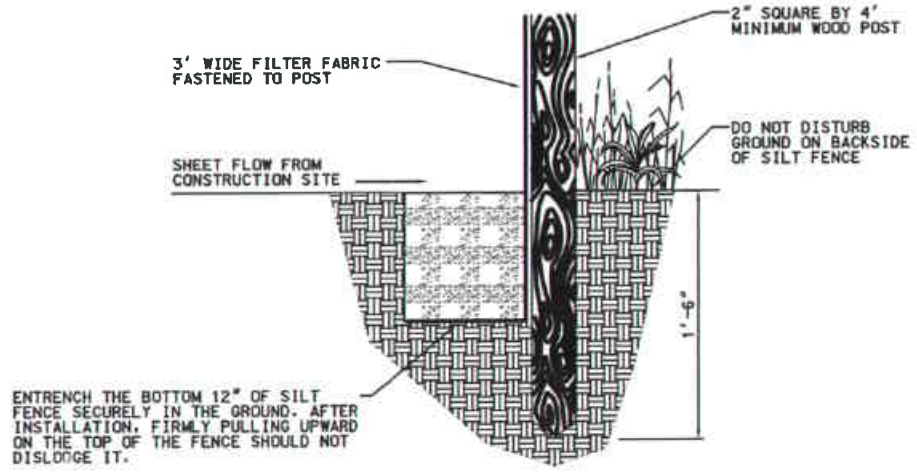
NOTES FOR CHECK DAMS:

1. PLACE A CHECK DAM AT EVERY TWO-FOOT DROP IN ELEVATION ALONG THE CUT DITCH.
2. A 9" TO 12" DIAMETER FIBER ROLL CAN BE USED IN PLACE OF THE 18" ROLL PROVIDED A ROLL IS INSTALLED AT EVERY ONE-FOOT DROP IN ELEVATION ALONG THE CUT DITCH.
3. PLACE CHECK DAMS PERPENDICULAR TO THE FLOW LINE OF THE DITCH.
4. DO NOT PLACE CHECK DAMS ACROSS NATURAL STREAM BEDS.
5. DO NOT USE STONE CHECK DAMS WITHIN CLEAR ZONES.
6. CONSTRUCT CHECK DAMS SO THAT WATER DOES NOT FLOW AROUND THE ENDS OF THE DAM.
7. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA AS DIRECTED BY THE OWNER.
8. AFTER SURROUNDING AREAS HAVE BEEN SEEDED AND MULCHED, SPREAD ROCK FROM CHECK DAMS TO LINE THE CUT DITCH AND BREAK APART FIBER ROLLS AND SPREAD THE STRAW OVER SEEDED AREAS.

SILT FENCE



PERSPECTIVE VIEW



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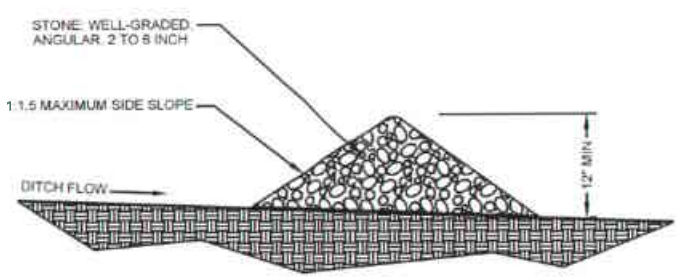

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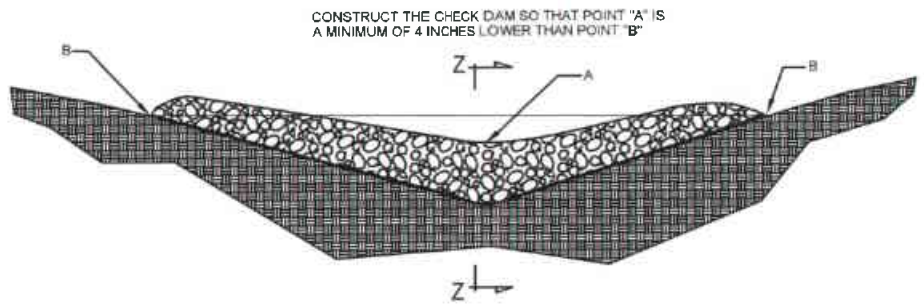

STONE CHECK DAM

NOTES FOR SILT FENCE:

1. WHERE PERMITTED, POSITION THE SILT FENCE 5' BEYOND THE TOE OF SLOPE.
2. TO AVOID CREATING LOW POINTS ALONG THE SILT FENCE, ALIGN THE FENCE ALONG THE CONTOUR AS MUCH AS POSSIBLE. WHERE EXCESSIVE RUNOFF WILL ACCUMULATE AT A LOW POINT, PROVIDE AN OPENING IN THE FENCE AND INSTALL A SEDIMENT TRAP.
3. WHEN EXCAVATING THE TRENCH, USE MACHINERY THAT WILL MINIMIZE DISTURBANCE.
4. TO PREVENT RUNOFF FROM FLOWING AROUND THE ENDS OF THE SILT FENCE, RUN THE ENDS OF THE FENCE UP SLOPE.
5. DO NOT PLACE SILT FENCE ACROSS POTENTIAL CONCENTRATED FLOWS (e.g., PIPE OUTLETS, DRAINAGE CHANNELS, CUT DITCHES).
6. AVOID USING SPLICES ALONG THE FENCE AS MUCH AS POSSIBLE. IF A SPLICE IS NECESSARY, BEFORE POUNDING IN THE END POSTS, OVERLAP THE END POSTS AND TWIST 180 DEGREES.
7. MAINTAIN A PROPERLY FUNCTIONING SILT FENCE THROUGHOUT THE DURATION OF THE PROJECT OR UNTIL DISTURBED AREAS HAVE BEEN VEGETATED.
8. WHEN A STORM EVENT DEPOSITS SEDIMENT BEHIND THE FENCE, REMOVE THE SEDIMENT AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.
9. IN AREAS THAT HAVE BEEN SEEDED AND MULCHED, REMOVE SILT FENCE UNLESS THEY ARE PROTECTING A WETLAND OR WATER BODY.
10. SILT FENCE INSTALLATION AS DIRECTED BY OWNER.
11. SILT FENCE WILL BE MAINTAINED ON AN ONGOING BASIS.

Title: Erosion Control Details (BMPS) Sheet 2 of 2

Bonneville Borrow Area
DOGM Permit Application

Proj No: 24585223

Figure: 5C

Date: MARCH 2012

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DO NOT DISTURB AREAS

ACCESS ROAD

SILT FENCE IS LIMIT OF DISTURBANCE ALONG NORTH END

SILT FENCE

WATER QUALITY POND 1
VOL=15 AC/FT
POND BOTTOM EL=4840 FT

ALLUVIAL BORROW AREA

INSTALL SEDIMENT TRAP

FOG

4950

4850

4750

4700

4650

PROP HAUL ROAD

CEMETERY

SILT FENCE

EXISTING DRAIN PIPE

LITTLE VALLEY WASH

PROTECT EXISTING TAILINGS DELIVERY PIPELINES (2)

VEHICLE TRACKING CONTROL ROCK PAD

CONCRETE WASHOUT AND VEHICLE WASH AREA

WATER QUALITY POND 2
VOL=7.5 AC/FT
POND BOTTOM EL=4810 FT

BONNEVILLE BORROW PERMIT BOUNDARY

RAILROAD (ABANDONED)

QUARTZITE BORROW AREA

RAILROAD CUT SLOPES (ABANDONED)

LEGEND

- GROWTH MEDIA STOCKPILE
- FOG — FUEL, OIL, GREASE STORAGE
- PROPOSED "V" DITCH
- FLOW DIRECTION

NOTES:

1. BASE TOPOGRAPHY PROVIDED BY KENNECOTT, JUNE 2010.
2. INSTALL PERIMETER SILT FENCE AROUND EACH GROWTH MEDIA AREA.
3. MAINTAIN SEDIMENT TRAP, SILT FENCES, AND DREDGE WATER QUALITY PONDS WHEN 1' OF SEDIMENT HAS ACCUMULATED.
4. 10-FOOT CONTOUR INTERVALS.

PLAN

0 250 500 750

SCALE IN FEET

N

FEASIBILITY - NOT FOR CONSTRUCTION

URS

URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
303-694-2770 (phone)
303-694-3946 (fax)

RioTinto

KENNECOTT TAILINGS EXPANSION FEASIBILITY STUDY MAGNA, UTAH

ISSUED FOR BIDDING — DATE BY

ISSUED FOR CONSTRUCTION — DATE BY

REVISIONS

NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		

URS PROJECT NO:	22242184
DRAWN BY:	DRAWN
DESIGNED BY:	DESIGNED
CHECKED BY:	CHECKED
DATE CREATED:	CREATED
PLOT DATE:	5/3/12
SCALE:	SCALE
ACAD VER:	AutoCAD 2011

SHEET TITLE

BONNEVILLE BORROW AREA SWPPP BMP'S STAGE-1

FIGURE 2

RioTinto

Bonding Calculations

Direct Costs		
Subtotal Demolition and Removal	$120,076.00	
Subtotal Backfilling and Grading	$3,662,369.00	
Subtotal Revegetation	$148,000.00	
Direct Costs	$3,930,445.00	
Indirect Costs		
Mob/Demob	$393,045.00	10.0%
Contingency	$196,522.00	5.0%
Engineering Redesign	$98,261.00	2.5%
Main Office Expense	$267,270.00	6.8%
Project Management Fee	$98,261.00	2.5%
Subtotal Indirect Costs	$1,053,359.00	26.8%
Total Cost 2010	$4,983,804.00	
Number of years		5
Escalation factor		0.012
Escalation	$306,292.00	
Reclamation Cost Escalated	$5,290,096.00	
Bond Amount (rounded to nearest $1,000) 2013 Dollars	$5,290,000.00	
Posted Bond (for 118 acres disturbed)	$5,290,000.00	
Difference Between Cost Estimate and Bond	$0.00	
Percent Difference		